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The lithospheric mantle and crust in the central Tibetan Plateau from INDEPTH electromagnetic data

Jan Vozar (1), Alan G. Jones (1), Florian Le Pape (1), Wei Wenbo (2), and the INDEPTH MT Team

(1) Dublin Institute for Advanced Studies, Dublin, Ireland (vozar@cp.dias.ie), (2) 2China University of Geosciences, Beijing, China

During the years 1995 and 1999 broadband and long period magnetotelluric data were collected and interpreted in Tibet as a part of Phase III of the InterNational DEep Profiling of Tibet and the Himalaya project (INDEPTH). Existing data from two N-S MT profiles (line 400 and 500) have been re-analysed and re-modelled to reveal deep-probing electromagnetic studies of the central Tibetian Plateau focused on the along-strike and across-strike structures of the Banggong-Nujiang Suture and the central Qiangtang metamorphic belt with the Shuanghu suture. Also, deep 1-D electromagnetic soundings were derived using magnetovariational responses. In addition to the well-known anomalously conductive middle to lower crust, we demonstrate that the most conductive deep crustal anomaly is situated in the lower crust of the southern part of the 500 line, i.e. southern Lhasa Terrane, and estimation of its conductance is similar to that of the east-west directed conductive channels which imply an elevated fluid content consistent with a weak crust that permits flow on a geological timescale. The bottom boundaries of the conductive layers resulting from 2-D MT inversions are in agreement with the Moho boundary depth for this region, although recent Receiver Function estimates suggest that the Moho is some 8 km shallower beneath the Qiangtang Terrane than beneath the Lhasa Terrane. This could explain the far higher conductance of the middle and lower crust beneath that terrane compared to the Lhasa Terrane. From deep electromagnetic sounding the next conductive layer – likely the top of the asthenosphere - can be estimated at depths of 200 km and greater. The Banggong-Nujiang Suture along strike analysis exhibits that the crustal conductive layer becomes shallower to the east of the 500 line. These along-strike differences represent varying conditions, such as temperature, partial melt content and connectivity, and fluid content and connectivity, and/or varying rock types.